Interagency Ecological Program for the Sacramento-San Joaquin Estuary

Newsletter

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For information on the Interagency Ecological Program, visit our home page on the World Wide Web (www.iep.water.ca.gov).

Readers are encouraged to submit brief articles or ideas for articles. Correspondence, including requests for changes in the mailing list, should be addressed to Randall Brown, California Department of Water Resources, 3251 S Street, Sacramento, CA 95816-7017.

Interagency Program Quarterly Highlights

Delta Flow Measurement (October to December 1997)

Richard N. Oltmann

All of the UVM stations provided usable data throughout the quarter except for Threemile Slough which was down until October 10 because of a destroyed transducer pile.

Ten-minute interval tidal flow time series were computed for each of the six ADCPs that were deployed in the south Delta during spring 1997. The ADCPs were deployed at:

1. San Joaquin River between Turner and Columbia Cuts
2. Turner Cut
3. Middle River between Columbia Cut and Connection Slough
4. Victoria Canal

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5. Old River between CCFB intake channel and Grantline Canal
6. Grantline Canal east of Tracy Road Bridge.

Flow data are available from April 1 or 2 through June 23 for all stations except for Grantline, which only has a 17-day record due to the ADCP being knocked over.

Analysis of the ADCP flow data shows some interesting effects on the flows at the ADCP sites due to the VAMP pulse-flow on the San Joaquin River, and the installation and removal of the temporary barrier at the head of Old River. A future newsletter article will present the ADCP flow data along with dye-concentration data from the April 28, 1997 release at Mossdale. Preliminary results from analysis of the dye and fish-recapture data are that the fish reached Jersey Point faster than the dye. The ADCP flow data indicate that the flow split between the San Joaquin River and Turner Cut is 4:1 (i.e., 20% of the San Joaquin River flow south of Turner Cut flows west through Turner Cut); fish recapture data were too sparse to determine the fish distribution at the Turner Cut split.

Delta Flow Measurement (January to March 1998)

Richard N. Oltmann

Almost all of the UVM stations survived the high flows of February without incurring serious damage and/or loss of data. The San Joaquin River at Stockton and the Sacramento River above Delta Cross Channel sites had transducers knocked out of alignment by floating debris which will result in some lost data. The transducers will be realigned as soon as flow conditions are acceptable.

USGS plans to do another dye study this spring in the south delta in conjunction with the release of salmon smolts on the San Joaquin River by USFWS and DFG. The current plan is to release fish and dye on the same day at Mossdale (about 3 miles upstream of the head of Old River) sometime between April 15-23. The head of Old River barrier will not be installed this year because the San Joaquin River flows are too high to permit installation. Automatic samplers will again be used to track the movement of the dye throughout the southern delta. Samplers will be deployed at nine sites with seven sites being at the same locations as last year; samplers will be set to collect hourly samples.

With partial support from DWR, USGS will again collect additional flow time-series data in the south delta this spring to augment the UVM flow network and to provide flow data to complement the dye study. ADCPs will again be used to provide a continuous velocity-profile record along with one new S4 point-velocity monitoring site. ADCPs will be deployed at the same six locations as last spring. The seven velocity monitoring sites will be:

1. San Joaquin River between Turner and Columbia Cuts
2. Turner Cut
3. Middle River between Columbia Cut and Connection Slough
4. Victoria Canal
5. Old River between CCFB intake channel and Grantline Canal
6. Grantline Canal east of Tracy Road Bridge
7. Old River east of CVP intake channel (S4 site).

The velocity monitoring equipment to be deployed in early April will remain in place for about 3 months. During the collection period, numerous flow measurements will be made at each site with a downward-looking ADCP flow measuring system. The flow measurements will be used to develop a velocity calibration curve for use in converting the ADCP/S4 measured velocities to mean cross-sectional velocities for use in computing a continuous flow record.

Delta Model Project Work Team

Chris Enright

The Delta Model PWT met in February to map out the scope of PWT work for the coming year. The goal of the team is to present a Delta model to the IEP which has been calibrated, verified and validated with input from multiple agency personnel. While acknowledging that hydrodynamics and water quality model development is an ongoing process of improvement, this goal represents a nominal final step in bringing the work of DWR's Delta Modeling Section to fruition.

The primary objectives of the Model PWT for the coming year are to: (1) complete an enhanced calibration of the DSM2 model, and (2) prepare a model validation document which details the error bounds to be expected under various modes of use. Tasks to be completed in the next three to four months include: (1) developing calibration protocols, (2) assessing resources available for advanced bathymetry data collection, (3) assessing model enhancements needed prior to calibration, and (4) collecting Delta flow and dye data (USGS lead with DWR support).

Splittail Investigations, Winter 1998

Randall Baxter

Work continued on three fronts to capture and radio tag adult splittail in the lower Sacramento River and track them to their spawning grounds. First, negotiations with NMFS led to agreement on methods for capturing splittail that would minimize take of winter-run chinook salmon. Second, we completed the design and got funding approval to install pumping equipment and a small fish-culture facility on DWR property at Hood. This facility was to hold "dummy"-tagged splittail to assess effects of tagging on behavior and survival. Though DWR Maintenance Shop personnel began work on the facility, increasing water levels in late January diverted their time to flood control and the facility was not completed until early March. We tested tag reception and practiced tag-implantation surgeries, while waiting for completion of the holding facility.

In early February, when increased water levels made it clear that holding facilities would not be completed in time for 1998, we decided to delay tagged-fish survival studies until 1999 and began angling to capture splittail for tagging. Several angling sites were tried, but only one proved successful in terms of both catch and limited loss of fishing gear. Nonetheless, only 19 adult splittail were caught in 23 angler days of effort and only 2 fish were large enough (340 mm FL) to radio tag. Radio tags were surgically implanted in these two fish. The remaining 17 splittail were tagged with Floy anchor tags. All were released at the tagging site. Radio telemetry from ground and air failed to locate either of the radio-tagged fish upstream of the fixed telemetry site at Hood. By the end of the month, diminishing catch and fish size indicated that most migrating fish were upstream of our site, so effort shifted to sampling adults and larvae in the lower Sutter Bypass.

Without tagged fish to track to potential spawning areas in the Sutter Bypass, gill net catches of adults guided placement of larva light traps to identify specific spawning locations. Based upon 1996 results, we set gill nets in or near riparian areas on either edge of the bypass channel. Through mid-March, thirteen 20-minute gill net sets collected 27 adult splittail, 4 carp, 2 white catfish, and 1 Sacramento sucker. Light traps were set within or on the edge of riparian vegetation and in open water in the vicinity of successful gill-net sampling. In two nights of sampling, light traps collected 4 larval splittail (7.7-8.3 mm TL) in 18 trap sets of 1.5 hrs each. These larvae probably hatched within a week of capture and had just reached the free-swimming stage. Prickly sculpin and bigscale logperch were the only other fish larvae collected. We have yet to locate a spawning site in 1998, but adult fish condition suggested that spawning was less than half over as of mid-March. Gill net and larva light-trap sampling will continue in the Sutter Bypass through April.

Mitten Crabs on the Move

Kathy Hieb and Tanya Veldhuizen

The Chinese mitten crab, *Eriocheir sinensis*, was first discovered in the San Francisco Estuary in 1992. Since then, its abundance has rapidly increased and its distribution in the estuary has greatly expanded. The mitten crab is catadromous and is well know for long distance upstream migrations to freshwater rearing areas. In its native range, the mitten crab has been reported to migrate 1400 km (870 miles) up the Yangtze River from the China Sea.

The mitten crab was accidentally introduced to Germany in the early 1900s where the population exploded and the distribution rapidly expanded. The mitten crab invaded neighboring countries such as the Netherlands, Belgium, Poland, Denmark and Sweden; juveniles were reported as far upstream as Prague, Czechoslovakia, which is 700 km (435 miles) up the Elbe River from the North Sea. Juvenile mitten crabs were reported to travel 1 to 3 km per day during their upstream migration while adult crabs traveled up to 12 km per day during their downstream migration. In Germany, the mitten crabs also demonstrated their renowned athletic ability, as they readily climbed over or circumvented small dams and weirs which blocked their migration route.

Since January 1998, we have received several reports of large numbers of migrating juvenile mitten crabs, which were most noticeable when they concentrated at the base of weirs or other structures in waterways. Mitten crabs were reported climbing over weirs in the Sutter and Yolo bypasses, including the Sacramento Weir, in February and March. Thousands of mitten crabs migrated up Mormon Slough and Little John Creek, to the east of Stockton, also in February and March. The USBR fish collection facility also collected large numbers of juvenile mitten crabs in January and early February.

All of the migrating juvenile crabs were 1 year old, with a carapace width of approximately 25 to 40 mm (1 to 1.5 inches); interestingly, at least 75% of the crabs we observed were males. These crabs probably reared in the delta last year, where they burrowed into banks for protection from desiccation and predators or sought cover in floating vegetation, especially water hyacinth.

We believe, based on their size, that these crabs will mature this fall, when they will migrate to brackish and saltwater to reproduce.

As of the last week of March 1998, the known distribution of the mitten crab extends north up the Sutter Bypass to Meridian, east up Little John Creek to Farmington and Mormon Slough to the Calaveras River, and south up the San Joaquin River near Vernalis. Although large numbers of downstream migrating adults have been documented in the delta and elsewhere in the estuary, this is the first time we have seen mass upstream migrations of juveniles from the delta. Although we do not know what cues these migrations, we hypothesize that increased outflow and overcrowded rearing areas may be important factors.

San Francisco Bay Fisheries Monitoring

Kathy Hieb

As expected, catches of fishes, shrimp, and Cancer crabs decreased dramatically in San Francisco Bay this winter in response to increased freshwater outflow and decreased salinities. This was most notable for marine pelagic species, such as northern anchovy and Pacific sardine, which emigrate from the bay more readily than demersal species when salinities decrease. Demersal species tend to move from the shoals to the channels before emigrating from the bay, as bottom salinities are higher in the channels than over the shoals. For example, in February and March 1998, bottom salinities ranged from 0.9 to 5.0‰ at our San Pablo Bay shoal stations, but ranged from 17.2 to 20.0‰ at our San Pablo Bay channel stations. Consequently, catches at the San Pablo Bay shoal stations were dominated by striped bass, yellowfin goby, and starry flounder, which are typically found in brackish water, while catches at the San Pablo Bay channel stations were dominated by Dungeness crab, Pacific tomcod, bay goby, and speckled sanddab, which are found at higher salinities.

Catches of several marine pelagic species did increase this winter, including night smelt and whitebait smelt (both osmerids) and topsmelt (an atherinid). Our catches of night and whitebait smelts typically increase in winter, when these species migrate to nearshore coastal areas, including bays, to spawn. Topsmelt are resident in the Bay and typically found in South Bay intertidal and shallow subtidal habitats year-round, but will migrate to open water areas in winter, especially after storms. Increased topsmelt catches during winter 1998 reflected fish migrating from these very shallow habitats, which our survey does not sample, to open water areas, which we do sample, rather than an increase in the bay's topsmelt population.

Our catches of Pacific sanddab, a demersal marine species, increased dramatically this winter. From January through March 1998, we collected 96 Pacific sanddabs; in contrast, from 1980 to 1996, we collected a total of 26 Pacific sanddabs. The fish collected in 1998 were from 113 to 242 mm and, based on lengths, most were 2 to 3 years old. It is likely the increased Pacific sanddab catches were related to the strong El Niño event - 11 of the 26 previously collected fish were from January though April 1983, when there was a very strong El Niño, while the remaining Pacific sanddab catches tended to be in years with weaker El Niño events.

We continued to collect the recently introduced goby, *Tridentiger barbatus*, in lower San Pablo Bay this winter. Two fish, 25 and 39 mm, were collected at one station in February, while 5 fish, ranging from 48 to 61 mm, were collected at one station in March. For more information about our newest resident, please see Kevin Fleming's article in the previous issue of the IEP Newsletter.

Herbicide Concentrations and Effects on Phytoplankton

Jody Edmunds, Kathy Kuivila, and Jim Cloern

The Contaminant Effects Team is examining the potential effects of herbicides in the Delta on phytoplankton photosynthesis and primary productivity in the Delta. The project will take two years to complete with funding from the USGS and IEP.

The field sampling has been completed (sampling ended November 13, 1997) and data are being analyzed. Chemical analyses have been completed for herbicide concentrations, phytoplankton biomass (chlorophyll *a*), phytoplankton photosynthesis, and basic water quality measurements (turbidity, temperature, specific conductivity, alkalinity, dissolved nutrients, and dissolved organic carbon). Phytoplankton species composition analyses are not yet finished.

Juvenile Salmonid Monitoring Program

Erin Sauls

Midwater trawling at Chipps Island captured 64 winter-run sized chinook salmon from January 1 through March 25 with the peak numbers in late March. Two peaks of fall-run sized salmon were seen at Chipps Island; one in mid-January and the other in early March. Delta smelt take has not limited our sampling this year although catch increased in late March.

In response to high outflows, we beach seined in San Francisco Bay Estuary to see if salmon were using the bay as a rearing area. Sampling was done once in late January and twice a month in February and March around San Pablo Bay and Suisun Bay. A total of 105 fall-run sized salmon was captured in this effort. No other race of salmon was captured in the bay.

Our other beach seining efforts on the Sacramento River, San Joaquin River, and delta captured 91 winter-run sized chinook. Most of these fish were captured near the city of Sacramento. It's difficult to compare these numbers to last winters' (1996-97) because our sampling was restricted in winter 1996-97 due to very high flows.

Between March 16-20, we conducted an experimental comparison between a one boat Kodiak trawl and a two boat Kodiak trawl near Sacramento. The single boat trawl uses the same net, but a different door design to keep it open. Preliminary results indicate similar raw catch numbers for chinook salmon between the two methods, but further analysis is needed. If the gears are comparable, the one boat gear obviously requires less staff and is thus more cost effective. Some safety concerns need to be considered before any further use of this modified kodiak trawl.

Our new Access database is up and running well. We have been entering our current field season data on a real-time basis and will continue processing data in this fashion for the IEP real-time monitoring effort. Our historical databases are being loaded into Access and updated with information from the field sheets not previously entered because of dBASE IV limitations. Eventually the data will be available on the IEP homepage.

Central Valley Salmon Team

Randall Brown

The Salmon Team met last on March 24, 1998. Among other things, team members agreed to develop a conceptual model of the life history of a Sacramento Valley fall chinook stock. The working model, to be completed by June 1, 1998, will be used by the team and CALFED to help determine the longterm monitoring and research priorities for Central Valley salmonids.

The team also heard a presentation by a representative of Northwest Marine Technology -a State of Washington firm which will receive a $600,000 CALFED grant to demonstrate mass marking of juvenile salmonids. Their patented equipment clips the adipose fins and inserts a coded wire tag into the noses of about 120 young salmon per minute. The tagging part of the operation is working about as well as planned, but more development is required for the presorting equipment. (Best results are obtained when individual batches of fish vary no more than about 10 mm from smallest to largest.) The company expects to have the technolgy completely operational in time for the 1999 brood year.

Status and Trends

Introduction

Randall Brown, DWR

This is the third annual status and trends issue of the Interagency Program *Newsletter*. As with the past status and trends issues, we hope you find it a handy and useful resource when looking for information about a variety of species and environmental parameters associated with the Sacramento/San Joaquin estuary.

Knowledge of the status and trends in abundance of key species and their supporting foodwebs is an essential component of Central Valley and estuarine restoration activities. Several programs are developing projects to "fix the delta" and its watershed, and an integral component of these program is a yardstick by which success can be measured. Although this brief summary is not intended to be the definitive measuring tool, it can provide a general sense of how well the system is doing.

The species and parameters covered in the status and trends issue varies from year to year. For example, the CALFED program just published its long-awaited draft proposals for the delta, including a list of indicator species; this issue presents a conceptual framework for indicator development used by CALFED.

We are always looking for feedback from agency staff and stakeholders on species or key parameters . Feedback can be either to any of the coordinators or management team members or directly to me: rbrown@water.ca.gov; 916/227-7531 voice; or 916/227-7554 fax.